Radionuclide “Dermal Backflow” in Lymphatic Obstruction

The use of radiotracers for the evaluation of the lymphatic system began shortly after World War 2. Recently, there has been renewed interest in lymphoscintigraphy because of new agents and modifications in equipment. The following case presents a radionuclide pattern demonstrated in lymphatic obstruction.

The patient is an 11-year-old boy with left-leg edema. The swelling began after an inguinal node biopsy 2 yr before the present evaluation. The biopsy specimen included several nodes and inflammatory tissue. The nodes showed reactive hyperplasia involving histiocytes, reticular fibers, and lymphatic cells. The picture was indicative of an inflammatory process. The patient’s general health was always good and the physical examination was normal except for the edematous leg.

Routine laboratory analysis, roentgenograms, and venogram were normal. The patent blue foot injection demonstrated “dermal backflow” in the left leg and normal lymphatic staining in the right leg. No deep lymphatics could be demonstrated in the left leg. A Tc-99m sulfur colloid lymphogram was performed by injecting 0.75 mCi of tracer into the subcutaneous tissue of each foot (between the second and third toes). The images were obtained 2 hr after injection. The findings are illustrated in Fig. 1. The patient was treated with support stockings.

Contrast lymphography is an established technique and provides the standard for radionuclide lymphography. The classification of lymphedema into primary and secondary forms has been described previously and is accepted by most investigators (1). The cause of primary lymphedema is not firmly established, but most favor a developmental defect. This category is further subclassified into aplastic, hypoplastic, and hyperplastic forms (2,3). Some investigators, however, suggest that inflammatory changes in the lymphatics are responsible for the hyperplastic form of primary lymphedema (4). Consequently there are divergent classifications of lymphedema, because secondary lymphedema is traditionally thought to result from an obstructing disease process.

In our patient with lymphedema secondary to lymph-node excision, the radionuclide lymphogram demonstrated “dermal backflow” and a decreased number of nodes at the surgical site. Dermal backflow represents drainage through dermal lymphatic collaterals that are the final result of lymphatic obstruction. The

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FIG. 2. A: Thyroid scan (100,000 counts) 20 min after Tc-99m pertechnetate. Thyroid is seen with right lower pole slightly indented (arrow). Cervical region otherwise is unremarkable. B: Neck scintiphoto, (300,000 counts) 20 min after Tc-99m DTPA. Activity is seen in three cervical masses.

tomas: a single right subclavian and bilateral intercarotid paraganglion tumors. An opportunity was provided to evaluate these chemodectomas with three radionuclides (Ga-67, Tc-99m pertechnetate, and Tc-99m DTPA); all successfully identified the lesions. Comparison of the images obtained 20 min after the intravenous injection of Tc-99m DTPA and pertechnetate demonstrated superior lesion visibility with Tc-99m DTPA.

These findings suggest a method of evaluating patients with possible chemodectomas. All such patients should be evaluated for multiple tumors, particularly if there is a family history of these, and those with multiple tumors should have their relatives examined for possible tumors (11). A radioangiogram of the cervical masses, together with immediate and delayed images, should be obtained. To exclude unsuspected additional paranglia, the immediate and delayed images should include views of the aortic arch, skull base, and proximal upper-limb vessels. Technetium-99m DTPA is suitable for the flow study, and as compared with pertechnetate has the potential advantage of the absence of interference by thyroidal (laryngeal paraganglion detection) and salivary (jugular paraganglia detection) activity in the delayed images. It is also possible that the tumor/background ratio is superior with Tc-99m DTPA. This approach may be expected to reduce the likelihood of false-negative findings.

MICHAEL A. WILSON
The Mount Sinai School of Medicine of the City University of New York
New York, NY

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pattern is not specific for any particular disease. Dermal lymphatic collaterals represent an alternate pathway of lymph return. "Dermal backflow" is a common observation following the injection of patent blue in the dermis in preparation for contrast lymphography, when secondary lymphedema, or the hyperplastic form of primary lymphedema, is present. Dermal backflow has also been demonstrated in intestinal lymphangiectasia, which may be part of a systemic lymphatic dysplasia.

Radionuclide lymphography is helpful in establishing a lymphatic cause for the edema. The advantage of the examination is its inherent simplicity. Frequently, lymphoscintigraphy can differentiate the lymphedema (5) as well as establish the diagnosis of chylothorax and acute surgical interruption. However, as can be observed in our images, the study is less anatomic than its counterpart in radiology, and may present difficulty in the evaluation of malignant disease.

JOHN A. STY
ROBERT A. BOEDECKER
GERARD T. SCANLON
DONALD P. BABBITT

Milwaukee Children's Hospital
Milwaukee, Wisconsin

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